A MODEL FOR THE SOCIAL SYSTEM FOR THE MULTIMAN EXTENDED DURATION SPACE SHIP *

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ABSTRACT

The conditions of isolation, confinement, and other stresses to which extended duration space crews will be exposed are unprecedented and many of the problems are not yet understood. Hypotheses directed toward principles to optimize crew organization and adaptation must be generated from present knowledge. Extrapolations might be attempted from various literature sources of human experience in extreme situations. However, the appropriateness of such generalization depends on the system similarity of the various situational contexts to that of the spaceship. A model social system for such microsocieties was constructed and system profiles of eleven well known system patterns were compared with that postulated for the extended duration spaceship. Greatest similarity was found for submarines, exploration parties, naval ships and bomber crews, and least for shipwrecks and disasters, industrial work groups, and prison groups.

INTRODUCTION

This report is part of a research program undertaken in anticipation of a need for behavioral science principles related to crew adaptability in the microsociety of extended duration space missions. Current analyses by space scientists at Boeing (1965), Douglas (1965) and General Dynamics (1965) of the timetable for manned flights to Venus and Mars estimate the earliest flyby of Mars between 1973 and 1977 and landing between 1982 and 1986. It is apparent that the conditions of confinement, isolation, and stress to which these crews will be exposed, during flights of one to three years duration, are unprecedented and that the problems involved are as yet not clearly understood. The lead time is not great and these problems must receive immediate attention to provide adequate opportunity for the research and development that will be required.

The present study is an attempt to understand and formulate the group behavior problems applicable to the extended duration space mission. It is concerned with group organization, structure, and interpersonal interaction of crew members in the environmental circumstances of a typical mission. The approach is to attempt to formulate a set of principles of social structure and group behavior as hypotheses for further research, using present knowledge as a point of departure. To maximize the application of present knowledge, it has been planned to supplement reviews of relevant literature with consultation with selected social scientists and experienced personnel in related situations.

Preliminary Exploration

One of the first steps in this study involved correspondence with a carefully selected panel of over 200 distinguished social scientists chosen on the basis of expertise in some aspect of the overall problem. They were sent a summary of the project objectives, approach, and procedures, and were asked to suggest significant problem areas, relevant literature, and ideas that might, in their judgment, pay off. This correspondence elictied overwhelming approval of the undertaking, without exception, from the entire panel, and a wide range of suggestions in response to the questions raised.

After reviewing and summarizing the suggestions, however, it became apparent that some definite criteria were needed to judge the relevance of data based on various situations, ranging from laboratory experiments to hazardous field observations, to the problems of the extended duration space ship. Such criteria in effect imply a conceptual model of the social system of the space ship microsociety.

Model definition was implicit in the discussion of constraints expected in the space ship situation that was presented in the summary memorandum referred to above. Among the probable features of this situation, the following were mentioned:

1. A formal organization with prescribed responsibility patterns for the entire crew;
2. Crew composition characterized by an elite corps of highly selected, trained, and educated volunteer specialists, all extremely ego-involved in the program and the mission;
3. Low organizational autonomy as a result of the NASA organizational and operational system and the affiliation of crew members with military and civilian career services;
4. Low formally prescribed status distance among crew members; and
5. High task demand and mutual dependence, under high levels of isolation, confinement, limitation of mobility and privacy, and environmental threat.

These constraints are believed to be correct, but

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although they point out several important characteristics of the space ship social system, they fall short of specifying the model. Further specification is attempted in this paper.

The Literatures on Isolation and Stress

An obligation of scientists approaching the present problem is to review critically available records and literatures on human experience in stressful, isolated, and confined situations in order to extrapolate significant observations, at least as hypotheses, to the situation of the extended-duration space ship. However, the literature in this broad category is vast and varies widely in relevance. Among the potential sources of information that have been suggested by consultants or staff members are field studies, participant accounts, and historical documents of incidents concerning naval ships, submarines, aircrews, prison populations, mental hospital populations, personnel at remote-duty radar sites and work parties, industrial work groups, athletic teams, exploration parties, personnel in air-raid shelters, shipwrecks, disaster situations, POW camps, and a variety of related situations that have received attention because they emphasized some unusual aspect of crisis, hazard, confinement, isolation, small-group process under stress, or the like. The problem of generalization of observations from such diverse situations is a major one which has received little systematic consideration by social scientists, who have apparently been more interested in particular aspects of behavior selected for study than in the contextual and systems aspects of the situations in which the behavior occurred.

The importance of this issue may be illustrated by an example. Consider for instance the difference between the effects of prison confinement of convicted criminals, of hospital confinement of mental patients, of confinement during depth bombing of a trapped submarine crew, and of confinement of a space crew in a capsule on a 500-day mission. The obvious differences, in intellectual and social level of the different groups, their motivation and identification with the situation, the conditions of confinement, the nature and acuteness of the stresses endured, the group solidarity, their training and preparation for the experience, and the payoff to individuals and group for successful endurance of the confinement, require little comment. In our opinion, variations among other relevant variables, such as those enumerated, may be of greater magnitude than that of the common, but by no means identical, variable, confinement.

Unfortunately, such is the nature of the literature available as background for the study of this new social situation in which isolation and confinement appear to be prominent conditions. However, these must be considered not only as particular aspects of a complex, multidimensional social system, but also in relation to other significant dimensions of the system. Despite the attention they have received, it appears that recognition of these variables as primary foci of the problem would be oversimplification.

DIMENSIONS OF THE MODEL

A distinction must be made between the broad dimensions of different types of social situations in which men have faced extreme environmental hazard and the modes of interaction exemplified in their behavior. In the former category, which is the focus of the present analysis, are such factors as group size, membership composition, organization, types of goals, sites of activity, equipment, skills, authority, and the like. The latter includes interpersonal behavior, leadership style, factors promoting or interfering with member motivation, and other principally behavioral aspects of group functioning. For purposes of clarity in communication we shall designate the first category by the term system structure of the microsociety, and the second, behavior patterns. In some cases, group behavior patterns may be highly standardized and appear as dimensions of structure.

In a perceptive report on the American Mount Everest Expedition, Emerson (1964) identified a number of aspects of the system structure of the Expedition as a means of facilitating the generalization of his results to a related class of group undertakings. Particular attention was directed in this report to three structural factors: (a) group size, (b) pursuit of group goals for which success or failure can be empirically defined, and (c) probability of success uncertain. Other factors, such as membership preselection and composition, sites of activity, equipment, skills, and authority involved were implicit in the identification of the Expedition. Such description of the setting in which certain behavior patterns were observed places these behaviors in a context of social structure in which the relevance of important constraints imposed by the system or particular system requirements can be evaluated. Generalization across contexts would be greatest when system characteristics are most similar. As similarity decreases, it is necessary to evaluate the effects of the variations observed.

The aim of this discussion is to propose a standard set of system structure characteristics that could be applied generally as a means of ordering various microsocieties according to their similarity to each other. This preliminary effort does not consider the weight or relative importance of particular characteristics to various systems or the variations among these over time or in different system states (confrontation with different problems). Some inferences on these issues are logically apparent and some information is available in the literature. However, the studies are scattered and do not fit into a uniform taxonomy. It is possible that the present attempt may have heuristic effects on needed studies of this type.

The system description involves seven categories that have general relevance. These are:

I. Objectives and goals
II. Philosophy and value systems
III. Personnel composition
IV. Organization
V. Technology
VI. Physical environment
VII. Temporal characteristics

Each of these categories involves important factors which can be ordered to some extent on continua conducive to comparative analysis.

Objectives and Goals

Several aspects of the objectives and goals of social organizations are more properly treated under category 4, organization. These relate to the degree of formal structure and involve consideration of whether they are officially specified and published or implied, whether they are mandatory or voluntary, and the nature of the authority under which they exist. In this section, the aspects of concern are the following:

Polarization. This reflects the extent to which an organization is goal oriented with respect to one or more major goals of importance to its sponsors and members. The space organization is highly polarized in both programs and projects, with clearly defined, announced goals.

Remoteness. This aspect refers to the time required between initiation of an activity and goal attainment. As the space program progresses, remoteness of overall goals is decreased, but duration of individual missions tends to increase, making their particular goals more remote.

Success Criteria. The criteria of success in goal attainment may vary from confusion and ambiguity, in the case of certain types of organizational goals, to clearly defined, measurable events or dimensions. Space mission goals have generally involved specific, measurable criteria, but some ambiguity may be pointed out in the assignment of credit. It has appeared, at least in the public press, that a greater share of credit is due to the planners and directors whose training and guidance was followed so skillfully by the astronauts in flight.

Success Uncertainty. An important consideration in any group enterprise involves the amount of uncertainty of mission success, both objectively and as perceived by the participants, and the objective and perceived consequences of failure. Despite the phenomenally successful record of American manned space missions to date, they may all be objectively characterized as involving high risk. The superb planning, provision of "backup" systems, testing, training, and overall preparation for successive missions has undoubtedly reduced subjective risk and increased confidence in the Mercury and Gemini programs. Nevertheless, new programs, such as Apollo, MOL, and Mars, bring new problems of unknown and known hazards to be faced and both objective and subjective uncertainty may be expected to fluctuate as new programs and missions within programs are activated.

Philosophy and Value Systems

The aspect of organizational philosophy of most general interest in the present context involves the values accepted with respect to the relative importance attributed to alternative goals and alternative means, costs, and risks related to the attainment of the preferred goals. With the exception of formal religious organizations, the governing value systems are rarely available in documentary form, but must be inferred from a variety of sources, such as the record of critical decisions made, key appointments, speeches and directives (as well as selected correspondence) by key officials, and the like. Such a study of NASA and related official values with respect to the space program would be valuable in the context of the present study. In its absence, the following speculations are tentatively proposed:

First, the operations of the American space program appear to continue the tradition of American military aviation with respect to command structure, mission emphasis, respect for individual lives, and cost-risk decisions.

Second, the American government has until now given the space program a very high priority and has placed virtually all of its facilities at the disposal of the space agencies for effective support.

Third, the astronaut value systems appear to reflect those of American military airmen, in character, motivation toward mission, family, and personal goals, professional attitudes and identifications, and of the traditions of American culture with respect to religious, moral, political, and social philosophy.

Personnel Composition

To the extend that the intellectual, motivational, personality, educational, professional, and moral characteristics of its members affect the functioning of an organization, both by the constraints implied by interaction of these with other factors, the limitations or specifications of the organization with respect to such characteristics constitute an important dimension.

More specifically, this category may be examined with respect to the upper and lower limits of intellect, education, training, experience, specified personality and moral characteristics, motivation of members to participate, dedication to mission, physical requirements, required skills, age range, sex, marital and parental status, religious background, and the like. This inventory might properly include the entire range of individual differences and

demographic characteristics. However, in the present context, it is believed that most of the relevant factors have been enumerated. The well-known bases of astronaut selection have, at least thus far, proved successful, although it is not possible to examine many of the critieria critically. To date, the astronaut group has been drawn, first from a select group of military test pilots with extensive jet experience, and more recently from a more heterogeneous group of men with this or other relevant scientific training. In all cases, intellectual, motivational, emotional maturity, moral, educational, and physical standards have been exceptionally high.

Organization

It is necessary to examine organizational structure in terms of the degree of formal structure involved, organizational complexity and formal provision for authority, decision-making and direction (command). These considerations involve centralization of authority, sanctions permitted, provision for succession, chain of command, and the power and role structure. Other factors include autonomy, control of member behavior by the organizational authorities, degree of participation of members in organizational activities, and degree of stratification of ranks or echelons.

The question of authority brings in formal documents, such as constitution, laws, directives, and the like, which may specify objectives and goals, as well as the limits of authority assigned to various offices and roles.

Although the organizational characteristics of the Mercuty and Gemini programs and space crews can be fairly well described, certain changes may be expected in extended-duration missions as a result of their duration and isolation, concerning which decisions must be made, to which it is hoped the present study may contribute. The organizational patterns of the Mercury and Gemini programs, with respect to overall structure as well as crew organization resemble closely those of military aviation, with much of the command responsibility held by ground command. However, in the Mars mission and other extended-duration efforts, there are grounds for expecting the transfer of much authority to the spaceship commander, and with this, problems of assuring integrity of command in the isolated space ship become acute. Another factor, which probably belongs in this category, is the size of the organization, in terms of the number of participants required to perform the central tasks.

Technology

It is almost meaningless to discuss organizational behavior without taking account of the nature, complexity, characteristic operations, and traditions implied by the technology involved. The technology not only makes distinctions, such as between jet aviation and the earlier piston-propeller era, which involve differences in speeds, altitudes, schedules, and pay-load, but also between personnel types, traditions, training, and other significant factors associated with the respective technological fields. The technology of the space programs is new, although it follows the aerospace tradition. Among the peculiar aspects are the overwhelming significance of intensive training in anticipated emergencies as a means of insuring reliability of performance, the high level of training, experience, and skill required of crew members, the glamor associated with astronaut status (at least until the present), and the high risk associated with the very masculine (in the United States) astronaut role. The space technology has created new jobs, new vocabulary and technical jargon, and is currently regarded as one of the frontiers of human advancement. The type and extent of training and preconditioning provided participants are related to this section.

Physical Environment

Among the significant characteristics of various social systems are the distinctive features of their task environments, which have implications for the level of risk involved and the nature and magnitude of stresses encountered. The space environments are principally two, the space medium, which is unfriendly and hazardous to man, and the space ship and equipment which protect him and provide a supportive environment that enables him to endure in space. In extended duration missions, with the enforced isolation and confinement of groups of men from 8 to 12 in number for periods up to 500 days or longer, the protective capsule itself may be a major source of social stress, compounded by the period of time during which crew members must share the unnaturally confined quarters as work, living, recreational, and quasi-personal space. Here, again, is an unprecedented experience for man, with only fragmentary sources from which to extrapolate estimates of needs and reactions.

Several additional aspects of the physical environment, which are also related to the technology, involve the distinctions between a maneuvering operation and a static environment, between extended exposure to embedded, but not intrusive stresses and occasional, insidious exposure to highly threatening conditions, and between organizations that plan and prepare means of coping with the hazards expected and those that are caught unprepared. It can be stated that the space ship is a maneuvering group, exposed to embedded, but not intrusive stresses over long periods, whose preparations for coping are exceptionally thorough and, until now, effective.

Temporal Characteristics

So far as is known, the Mars mission and others of its general class involve continuous exposure to stress for human groups of an unprecedented temporal magnitude. Further, the capsule environment fits the description of a total environment (Goffman, 1957), in which enforced assocation is continuous and without the respite of discontinuity afforded man in his

accustomed habitat, in which he enjoys discontinuities of a tension-relieving quality when he moves from home to work to lunch, and so forth, in his daily life. An effect of the total environment, which may be mitigated to some extent by scheduling and by the provision of opportunities for privacy and solitude, is the magnification of interpersonal stresses generated by the enforced close contacts.

COMPARISON OF TWELVE SOCIAL SYSTEM PROFILES

On the basis of descriptive information on their generic characteristics in the literature, an attempt has been made by the writer to compare fifty-six reputed system characteristics of the extended-duration space ship with those of eleven other reference systems, each of which involves isolation, confinement, and/or stress to a high degree, and for which there is substantial information in the literature. These are:

1. Exploration parties and expeditions
2. Submarines
3. Naval ships
4. Bomber crews
5. Remote duty organizations (e.g. radar sites)
6. Professional athletic teams
7. Industrial work groups
8. Shipwrecks and disaster situations
9. Prisoner of war groups
10. Prison society
11. Mental hospital wards

The fifty-six system characteristics are subsets of the seven major categories described in the preceding section and are listed in the margin of Table 1. Taken as a whole, they constitute a preliminary effort to develop a system profile of significant aspects of a miniature social system. The entries in Table 1 represent comparison ratings of similarity to the condition of the extended duration space ship on each factor for each of the eleven comparison systems selected. Thus each column in Table 1 is presented as a system profile.

The entries in Table 1 are on a three-point scale: 2 (highly similar to the extended-duration space ship situation), 1 (moderately similar), and 0 (dissimilar or unrelated). These were inserted according to the judgment of the author on the systems compared. A maximum similarity score, for the 56 items, would be 112; scores could range from 112 to 0.

The data in Table 1 rank the eleven comparison systems on similarity to the extended duration space ship as follows:

Systems	Similarity Rank	Similarity Score
2. Submarines	1	79
1. Exploration parties	2	68
3. Naval ships	3	61
4. Bomber crews	4	60
5. Remote duty stations	5	59
9. POW situations	6	39
6. Professional athletic teams	7	37
11. Mental hospital wards	8	23
10. Prison society	9	20
7. Industrial work groups	10	16
8. Shipwrecks and disasters	11	11

Table 2 is interesting in that it indicates areas of similarity and dissimilarity among the eleven comparison systems with the space ship system by major category of comparison. Submarines are most similar overall, but match the space ship situation more closely in respect to goals, value systems, and organization, than on the other factors. POW situations, mental hospital wards, and prison groups are low in profile similarity, but are nevertheless high with respect to similarity of physical environment and temporal characteristics. In terms of overall closeness of fit, submarines, exploration parties, and bomber crews are most similar to the social system of the extended-duration space ship, while industrial work groups and shipwreck and disaster situations are most dissimilar. Nevertheless, it is of interest that the latter situations have been so frequently cited as significant literatures source for the present problem, without concern for the appropriateness of such generalization.

DISCUSSION

The foregoing analysis represents a preliminary attempt to compare the social system of the extended-duration space ship with several other types of social system that have been suggested as background sources for extrapolation of observations and generalization of principles. Although based on subjective judgment and on an unweighted and preliminary set of factors, the results demonstrate widespread differences among the twelve selected social systems compared, thus raising questions that invite serious concern about the utility to studies of the extended duration space ship problem of some of the most frequently suggested sources, as well as greater interest in others.

As a result of the favorable position of exploration parties, submarines, and naval ships (which would come out even more favorably if confined to the sailing ship era), several profitable historical studies of these literatures have been undertaken within our research group. The results of the present analysis also enhance the importance of certain contemporary studies, such as those of Emerson (1965) and Lester (1965) on the Mount Everest Expedition, of Weybrew (1963) and others in the submarine service, and of Gunderson and Nelson (1963) in the Antartic. Until adequate evaluation is made of the influences of variations in major system characteristics on behavior of groups and individuals in these groups, extreme caution is indicated in making generalizations from experimental and field observational results.

Table 1. Comparison of Social System Profiles of Eleven System Patterns with that of the Extended Duration Space Ship. Comparison Systems are identified as follows: 1. Exploration Parties and Expeditions, 2. Submarines, 3. Naval Ships, 4. Bomber Crews, 5. Remote Duty Stations, 6. Professional Athletic Teams, 7. Industrial Work Groups, 8. Shipwrecks and Disaster Situations, 9. Prisoner of War Situations, 10. Prison Society, 11. Mental Hospital Wards. Ratings indicate degree of similarity to the Extended Duration Space Ship social system on a three-point scale: 2 (highly similar), 1 (moderately similar), 0 (dissimilar or unrelated).

System Characteristics	Comparison System 1	2	3	4	5	6	7	8	9	10	11
I. Objectives and Goals											
1. Formally Prescribed	1	2	2	2	2	2	2	0	1	1	1
2. Mandatory	1	2	2	2	2	1	1	0	1	1	1
3. Formal Authority	1	2	2	2	2	1	1	0	1	1	1
4. Polarization	2	1	1	2	1	2	1	0	0	0	0
5. Remoteness of Goals	1	2	2	0	2	1	1	0	2	0	0
6. Success Criteria	2	2	1	2	0	2	1	0	2	1	1
7. Success Uncertainty	2	2	2	2	1	2	1	2	2	0	0
II. Value Systems											
8. Obedience to Command	1	2	2	2	2	1	1	0	1	0	0
9. Mission Emphasis	1	2	2	2	2	1	1	0	0	0	0
10. Respect for Indiv. Lives	2	2	2	2	2	0	1	0	1	0	1
11. High National Priority	0	1	1	1	1	0	0	0	0	0	0
12. Military Trad. in Pers. Attits.	0	2	2	1	1	0	0	0	2	0	0
13. Accept. of Amer. Way of Life	0	2	2	1	1	0	0	0	0	0	0
III. Personnel Composition											
14. Intellectual	1	1	0	0	0	0	0	0	0	0	0
15. Educational Level	1	1	0	0	0	0	0	0	0	0	0
16. Extent of Relevant Training	1	1	1	0	1	1	1	0	1	0	0
17. Extent of Relevant Experience	2	1	1	0	0	1	1	0	0	1	0
18. Personality Selectivity	1	1	0	1	0	0	0	0	0	0	0
19. Moral Selectivity	1	1	0	1	1	0	0	0	0	0	0
20. Physical Selectivity	1	1	1	1	1	1	0	0	1	0	0
21. Possession of Requisite Skills	2	1	1	1	1	2	1	0	0	0	0
22. Motivation to Participate	2	1	0	0	0	1	0	0	0	0	0
23. Sex of Participants	2	2	2	2	2	2	0	0	2	0	0
24. Age Range	1	1	0	0	0	2	0	0	0	0	0
25. Presence of Non-Crew Pers.	2	1	0	0	0	0	0	0	0	0	0
26. Rank distribution (all "officers")	1	0	0	0	0	0	0	0	0	0	0
IV. Organization											
27. Formal Structure	1	2	2	2	2	1	1	0	1	0	0
28. Prescribed Roles	2	2	2	2	2	1	1	0	1	0	0
29. Command Structure	1	2	2	2	2	1	0	0	1	0	0
30. Centralized Authority	1	2	2	2	2	1	0	0	0	0	0
31. Chain of Command with Provision for Succession	1	2	2	2	2	0	0	0	1	0	0
32. Extensive Back-up Organization	1	2	2	2	2	0	0	0	1	0	0
33. Low Autonomy re Goals	1	2	2	2	2	0	1	0	0	0	0
34. Group Size (8-12)	0	0	0	0	0	0	0	0	0	0	0
35. Prescribed Discipline	1	2	2	2	2	1	0	0	1	2	1
36. Low Prescribed Social Distance Among Crew	2	0	0	0	2	0	0	0	0	0	0
37. Congruency of Rank and Status	2	2	1	1	1	0	0	0	0	0	0

Table 1. Continued

System Characteristics	Comparison System 1	2	3	4	5	6	7	8	9	10	11
V. Technology											
38. High Technologic Complexity	1	2	1	1	1	0	0	0	0	0	0
39. Relation to Aviation Tradition	0	1	1	1	2	0	0	0	0	0	0
40. Use of Simulators and Other Technical Training Devices	0	1	1	1	1	0	0	0	0	0	0
41. Extensive Preparation for Missions	2	1	1	1	0	1	0	0	0	0	0
42. Use of Technical Language in Execution	2	2	1	1	1	1	0	0	0	0	0
43. Physical Preconditioning	1	1	1	1	0	1	0	0	0	0	0
44. Scientific Principles Involved	1	1	1	1	1	0	0	0	0	0	0
VI. Physical Environment											
45. Required Physiol. Protection and Life Support	1	2	0	0	0	0	0	0	0	0	0
46. Extreme Remoteness from Base	1	1	1	1	1	0	0	1	2	1	1
47. Presence of Unknown Environmental Hazards	2	1	1	1	0	0	0	2	2	0	1
48. Extreme Confinement in Capsule	0	1	0	0	1	0	0	0	2	2	2
49. High Endurance Demands	2	1	0	0	0	1	0	2	2	0	0
50. Reduced Communication	1	1	1	1	1	0	0	2	2	2	2
51. Social Isolation	1	1	1	1	1	0	0	2	2	2	2
52. Maneuvering Situation	2	1	1	1	0	1	0	0	0	0	0
53. Embedded Environmental Stresses	2	2	1	1	1	0	0	0	2	0	1
VII. Temporal Characteristics											
54. Long Duration of Exposure	1	1	1	1	1	0	0	0	2	2	2
55. Total Environmental Situation	2	2	0	0	2	0	0	0	2	2	2
56. Remoteness of Goals	1	1	1	1	1	1	0	0	2	2	2

Table 2. Analysis of System Similarties by Descriptive Category. The numbers 2, 1, and 0 are used here to indicate similarity on the following basis: 2, for matching over 70 per cent of items in the category (Table 1); 1, for matching 31 to 70 per cent; and 0, for matching less than 30 per cent.

Comparison Systems	System Description Category: Objectives and Goals	Value Systems	Pers. Comp.	Organiz.	Technol.	Phys. Envir.	Temporal Chars.
2. Submarines	2	2	1	2	1	1	1
1. Explorat. Parties	2	1	1	1	1	1	1
3. Naval Ships	2	2	0	2	1	1	0
4. Bomber Crews	2	2	1	2	1	1	0
5. Remote Duty Stas.	2	2	0	2	1	0	1
9. POW Situations	1	1	0	0	0	2	2
6. Prof. Athl. Teams	2	0	1	0	0	0	0
11. Ment. Hosp. Wards	0	0	0	0	0	1	2
10. Prison Society	0	0	0	0	0	1	2
7. Industr. Work Grs.	1	0	0	0	0	0	0
8. Shipwrecks and Disasters	0	0	0	0	0	1	0

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